

Microstructural and Mechanical Properties of Welding and Thermal Spraying Coatings on Ductile Cast Iron

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Abstract: The subject of this work is to evaluate the influence and adhesion degree of different coating layers deposited on a ductile cast iron substrate by two different methods, thermal spraying and welding with and without use of an interlayer. Microstructures of different zones and interfaces of coated specimens are investigated using optical microscope and scanning electron microscope SEM. Also, the mechanical behavior was evaluated by tensile test. It is found that when stainless steel thermal spraying coating onto the ductile cast iron substrate, the use of the nickel-based interlayer Ni allowed us to mitigate the disadvantages of cracking at the interface. This is due to the mechanical effect of nickel plasticity. In the case of coating by welding, the use of nickel-based buttering ENi-CI allowed us to reduce the diffusion of graphite to stainless steel, resulting in a reduction in the formation of harder alloy carbides. Finally, the mechanicals tests in particular the tensile test shows that the coating by welding is effective but causes a structural hardening; on the other hand the coating realized by thermal spraying does not really present sufficient adhesion.

Keywords : Ductile Cast Iron, mechanical properties, microstructure, Thermal Spraying, Welding Coating